UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/911,764	07/25/2001	Apostolis Papathanasiou	17390US01	5067

23446   7590   11/12/2008
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ART UNIT	PAPER NUMBER
2193	

MAIL DATE	DELIVERY MODE
11/12/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _07 August 2008_.
2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _20-53_ is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) _20-53_ is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All b)☐ Some * c)☐ None of:
      1.☐ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____.
      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)
1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.
4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application
6)☐ Other: _____.

DETAILED ACTION

1.   This communication is responsive to Amendment filed 08/07/2008.

2.   Claims 20-53 are pending in this application. Claims 20 and 37 are independent claims.

In Amendment, claims 1-19 are cancelled previously. This Office Action is made final.

Claim Objections

3.   Claims 21-28 are objected to because of the following informalities:

       Re claims 21-28, these claims are missing the dependency on preceding claim 20

as listed in the previous amendment.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5.   Claims 20-53 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with

the enablement requirement. The claim(s) contains subject matter which was not described in

the specification in such a way as to enable one skilled in the art to which it pertains, or with

which it is most nearly connected, to make and/or use the invention.

       Re claim 20, the newly added limitations "means adaptively configuring one or

more filters utilizing at least a portion of said set of complex number arithmetic

adaptation parameters" were not described in the specification in such a detail way as to

enable one skilled in the art to make and/or use the invention. At most, the original

specification only merely mentions the term of filter in the Background of the invention,

but not in a detail within the specification as required. Claim 37 has the similar rejection.

Re claims 48, the newly added limitation "one or more processors" was not

described in the specification in such a detail way as to enable one skilled in the art to

make and/or use the invention. Claims 49-53 have the similar rejection.

Thus, claims 21-38 and 39-53 are also rejected for being dependent on the

rejected base claims 21 and 37 respectively.

Claim Rejections - 35 USC § 101

6.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or
> any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and
> requirements of this title.

7.   Claims 20-53 are rejected under 35 U.S.C. 101 because the claimed invention is directed

to non-statutory subject matter.

Claims 20-53 cite a system for processing data in accordance with a mathematical

algorithm. However, claims 20-53 merely disclose series mental steps/components for

performing operations comprising mathematical transformation and solving system

without disclosing a practical/physical application. Further, the claims appear to preempt

every substantial practical application of the idea embodied by the claims. In addition,

claims 20-36 are considered as software per se since all the means are the software

module for performing the intended function. Even though, the claims disclose a filtering

parameters and filtering processes, but this filtering process can be mathematical filtering

and the final result is just a parameter. Therefore, claims 20-53 are directed to non-

statutory subject matter.

Claim Rejections - 35 USC § 103

8.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

9.   Claims 20-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Martin et al.

("Unitary ESPRIT: How to Obtain Increased Estimation Accuracy with a Reduced

Computational Burden") in view of the admitted prior art.

          Re claim 20, Martin et al. disclose in the article a system for processing signals

(e.g. abstract in page 1232 and conclusion remark in page 1241 by

filtering/reconstructing the original waveform/signal), the system comprising: means for

transforming adaptation observations from a complex arithmetic to two sets of real

number arithmetic observations by means of binary orthogonalization transformation

(BOT) (e.g. page 1232 right column lines 3-17 which transforming/converting the

complex matrices into a set of real matrices); a means for computing two sets of real

number arithmetic adaptation parameters by applying a solution algorithm to said two

sets of real number arithmetic observations (e.g. section B as real implementation in page

1236 wherein least square solution can be applied here); and means for transforming said

two sets of real adaptation parameters to a set of complex number arithmetic adaptation

parameters using an inverse binary orthogonalization transform (IBOT) (e.g. as reversed

processed of BOT above, page 1232 right column lines of first paragraph, and right

column lines 8-10 page 1232), and said means adaptively configuring one or more filters

utilizing at least a portion of the set of complex arithmetic adaptation parameters (e.g.

abstract in page 1232 and conclusion section in page 1241 for filtering/reconstructing the

original waveform/signal using the above technique).

Martin et al. fail to explicitly spell-out the term LESS as a means for computing

two sets of real number arithmetic adaptation parameters by applying two real number

Least Square Solvers (LESS) to said two sets of real number arithmetic observations.

However, the admitted prior art discloses in page 1 a means for computing two sets of

real number arithmetic adaptation parameters by applying two real number Least Square

Solvers (LESS) to said two sets of real number arithmetic observations (e.g. last two

paragraphs in page 1 wherein LESS is common and most widely used in solving such

systems of linear equations).

Therefore, it would have been obvious to a person having ordinary skill in the art

at the time the invention is made to add a means for computing two sets of real number

arithmetic adaptation parameters by applying two real number Least Square Solvers

(LESS) to said two sets of real number arithmetic observations as taught in the admitted

prior art to Martin et al.'s invention because it would enable to solve unknowns in linear

equations efficiently (e.g. as common and widely used in many practical application in

page 1 of the original application).

Re claims 21-22, Martin et al. fail to disclose two real number LESS are applied in parallel and series. However, the admitted prior art discloses in Figure 1 the LESS are applied in series manner (e.g. component 100 in Figure 1) and the examiner takes an office notice that operating an algorithm in parallel manner is well-known in the art and widely used in many practical application in the technology.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention is made to apply the LESS in parallel and series manner into Martin's invention because it would enable to improve the system performance (e.g. parallel manner would increase the speed operation and series manner would increase the dependency).

Re claims 23-24, Martin fails to disclose the LESS comprises a Recursive Least Squares algorithm (RLS) and a Least Mean Squares (LMS) algorithm. However, the admitted prior art discloses the LESS comprises RLS and LMS (e.g. last two paragraphs in page 1 of original specification).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention is made to add the LESS comprises RLS and LMS as taught in the admitted prior art to Martin et al.'s invention because it would enable to solve unknowns in linear equations efficiently (e.g. as common and widely used in many practical application in page 1 of the original application).

Re claims 25-27, Martin et al. fail to disclose LESS is a Householder transformation; Cholesky decomposition; and QR Decomposition (QRD). However, the admitted prior art discloses the LESS is a Householder transformation (e.g. last paragraph

in page 4); Cholesky decomposition (e.g. last paragraph in page 4); and QR

Decomposition (QRD) (e.g. last two paragraphs in page 1).

Therefore, it would have been obvious to a person having ordinary skill in the art

at the time the invention is made to add the LESS is a Householder transformation;

Cholesky decomposition; and QR Decomposition (QRD) as taught in the admitted prior

art to Martin et al. 's invention because it would enable to solve unknowns in linear

equations efficiently (e.g. as common and widely used in many practical application in

page 1 of the original application).

Re claim 28, Martin et al. fail to disclose the RLS is computed by a systolic array.

However, the admitted prior art discloses the RLS is computed by a systolic array (e.g.

page paragraph in page 4).

Therefore, it would have been obvious to a person having ordinary skill in the art

at the time the invention is made to add the RLS is computed by a systolic array as taught

in the admitted prior art to Martin et al.'s invention because it would enable to improve

the system performance (e.g. by implementing the systolic array).

Re claims 29-30, Martin et al. fail to disclose the LESS utilizes one or more a

Block Matched Filter Estimator (BMFE), a Block Zero Forcing Estimator (BZFE), and/or

a Block Minimum Mean Square Error Estimator (BMMSEE) and computed via one or

both a Cholesky decomposition and a QR Decomposition (QRD). However, the admitted

prior art discloses in Figure 1 the LESS utilizes one or more a Block Matched Filter

Estimator (BMFE), a Block Zero Forcing Estimator (BZFE), and/or a Block Minimum

Mean Square Error Estimator (BMMSEE) (e.g. last four lines of last paragraph in page 4)

and computed via one or both a Cholesky decomposition and a QR Decomposition (QRD) (e.g. last paragraph in page 4).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention is made to add the LESS utilizes one or more a Block Matched Filter Estimator (BMFE), a Block Zero Forcing Estimator (BZFE), and/or a Block Minimum Mean Square Error Estimator (BMMSEE) and computed via one or both a Cholesky decomposition and a QR Decomposition (QRD) as taught in the admitted prior art to Martin et al.'s invention because it would enable to solve unknowns in linear equations efficiently (e.g. as common and widely used in many practical application in page 1 of the original application).

Re claim 31, it has similar limitations cited in claim 20. Thus, claim 31 is also rejected under the same rationale as cited in the rejection of rejected claim 20.

Re claims 32-36, Martin et al. do not disclose linear system performing one or more of temporal, spatial, joint temporal, and/or spatial channel estimation of the signal; spatial channel equalization, carrier frequency estimation, Direction of Arrival (DOA) estimation, and joint carrier frequency and DOA estimation, an adaptive filter, and channel estimation, system parameter estimation, channel equalization, recursive updating of output parameters, non-recursive updating of output parameters, and system identification. However, the admitted prior art discloses in Figure 1 linear system performing one or more of temporal, spatial, joint temporal, and/or spatial channel estimation of the signal; spatial channel equalization, carrier frequency estimation, Direction of Arrival (DOA) estimation, and joint carrier frequency and DOA estimation,

an adaptive filter, and channel estimation, system parameter estimation, channel

equalization, recursive updating of output parameters, non-recursive updating of output

parameters, and system identification (e.g. page 1 and page 4 as under background of

invention and admitted prior art Figure 1).

Therefore, it would have been obvious applications to a person having ordinary

skill in the art at the time the invention is made to apply the linear system performing one

or more of temporal, spatial, joint temporal, and/or spatial channel estimation of the

signal; spatial channel equalization, carrier frequency estimation, Direction of Arrival

(DOA) estimation, and joint carrier frequency and DOA estimation, an adaptive filter,

and channel estimation, system parameter estimation, channel equalization, recursive

updating of output parameters, non-recursive updating of output parameters, and system

identification as taught in the admitted prior art to Martin et al.'s invention because it

would enable to reduce the complexity of computing the estimated signals.

Re claim 37, it is a system claim having similar limitations cited in claim 20.

Thus, claim 37 is also rejected under the same rationale as cited in the rejection of

rejected claim 20.

Re claim 38, it is a system claim having similar limitations cited in claim 21.

Thus, claim 38 is also rejected under the same rationale as cited in the rejection of

rejected claim 21.

Re claim 39, it is a system claim having similar limitations cited in claim 22.

Thus, claim 39 is also rejected under the same rationale as cited in the rejection of

rejected claim 22.

Re claim 40, it is a system claim having similar limitations cited in claim 23. Thus, claim 40 is also rejected under the same rationale as cited in the rejection of rejected claim 23.

Re claim 41, it is a system claim having similar limitations cited in claim 24. Thus, claim 41 is also rejected under the same rationale as cited in the rejection of rejected claim 24.

Re claim 42, it is a system claim having similar limitations cited in claim 25. Thus, claim 42 is also rejected under the same rationale as cited in the rejection of rejected claim 25.

Re claim 43, it is a system claim having similar limitations cited in claim 26. Thus, claim 43 is also rejected under the same rationale as cited in the rejection of rejected claim 26.

Re claim 44, it is a system claim having similar limitations cited in claim 27. Thus, claim 44 is also rejected under the same rationale as cited in the rejection of rejected claim 27.

Re claim 45, it is a system claim having similar limitations cited in claim 28. Thus, claim 45 is also rejected under the same rationale as cited in the rejection of rejected claim 28.

Re claim 46, it is a system claim having similar limitations cited in claim 29. Thus, claim 46 is also rejected under the same rationale as cited in the rejection of rejected claim 29.

Re claim 47, it is a system claim having similar limitations cited in claim 30. Thus, claim 47 is also rejected under the same rationale as cited in the rejection of rejected claim 30.

Re claim 48, it is a system claim having similar limitations cited in claim 31. Thus, claim 48 is also rejected under the same rationale as cited in the rejection of rejected claim 31.

Re claim 49, it is a system claim having similar limitations cited in claim 32. Thus, claim 49 is also rejected under the same rationale as cited in the rejection of rejected claim 32.

Re claim 50, it is a system claim having similar limitations cited in claim 33. Thus, claim 50 is also rejected under the same rationale as cited in the rejection of rejected claim 33.

Re claim 51, it is a system claim having similar limitations cited in claim 34. Thus, claim 51 is also rejected under the same rationale as cited in the rejection of rejected claim 34.

Re claim 52, it is a system claim having similar limitations cited in claim 35. Thus, claim 52 is also rejected under the same rationale as cited in the rejection of rejected claim 35.

Re claim 53, it is a system claim having similar limitations cited in claim 36. Thus, claim 53 is also rejected under the same rationale as cited in the rejection of rejected claim 36.

Response to Amendment

10.   The amendment filed 08/07/2008 is objected to under 35 U.S.C. 132(a) because it

introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall

introduce new matter into the disclosure of the invention. The added material which is not

supported by the original disclosure is as follows:

> The newly added limitations in the amended claims "means adaptively
>
> configuring one or more filters utilizing at least a portion of said set of complex number
>
> arithmetic adaptation parameters" and "one or more processors" are considered new
>
> matter introduced into the disclosure.
>
> Applicant is required to cancel the new matter in the reply to this Office Action.

Response to Arguments

11.   Applicant's arguments filed 08/07/2008 have been fully considered but they are not

persuasive.

> a.   The applicant argues in page 12 first paragraph for claims rejected under 35
>
> U.S.C. 101 that the newly added limitations "means adaptively configuring one or more
>
> filters utilizing at least a portion of said set of complex number arithmetic adaptation
>
> parameters" would overcome the 101 rejection since it is used to configure the filter.
>
> > The examiner respectfully submits that the newly added limitation introduces
> >
> > more rejection as necessary since it has never been fully addressed in the original
> >
> > disclosure. In addition, the amendment does not fully address all the issues

related to the claims under 35 U.S.C. 101 including practical application, pre-

emption, and software per se.

b.   The applicant argues in pages 14-17 that the cited references by Martin and

AAPA do not disclose or suggest the limitation of "means for transforming adaptation

observations from a complex arithmetic to two sets of real number arithmetic

observations by means of BOT.

        The examiner respectfully submits that the current claim language does not

        clearly define or require specifically of how to perform the transformation from

        complex to real. Thus, as long as any reference show the support of

        transformation of complex to set of real, then that reference would meet the

        claimed language. In the broadest interpretation, page 1232 right column lines 3-

        17 clearly disclose a general ideal/step of transforming complex matrices into

        <decompositions> of real matrices of the same size wherein the matrix or

        matrices is same size, but multiple of the real matrices due to transformation and

        decomposition of the complex matrices.

c.   The applicant argues in pages 16-17 that the AAPA does not disclose the step of

"computing two sets…LESS to said two sets of real…" since the AAPA only applies the

LESS to the complex value inputs.

        The examiner respectfully submits that the applicant might have miss-interpreted

        the Office action since the Examiner only borrows or applies the concept of LESS

for optimization process rather then the whole above step. Otherwise, the AAPA

alone would anticipate the claimed invention. Basically, the examiner combines

the LESS concept seen in AAPA into the real matrices transformed by Martin in

order to efficiently solving unknowns in linear system equations due to

optimization of the LESS.

d.   The applicant argues in pages 17-19 that the primary reference fails to disclose

the IBOT as cited in the claimed invention since at most Martin only discloses the

invertible transformations that map Centro-Hermitian matrices to real matrices.

The examiner respectfully submits that the term "invertible" means capable of

vice versa or forward and backward transformation. Thus from the citations

along with explanation, it logically and reasonably disclose the inverted processes

of transformation wherein the transformation is BOT. Thus, the inverted

processes of BOT is IBOT as cited in the claimed invention in order to get back

the original "domain" data.

e.   The applicant argues in pages 19-20 that the cited reference by Martin does not

disclose the newly added limitations "means adaptively configuring one or more filters

utilizing at least a portion of said set of complex number arithmetic adaptation

parameters".

The examiner respectfully submits that the original specification nor the claim

language does not define or require a specific structure of the configuration nor

the filter. Thus, any reference or citation using the result of transformation or

manipulation would meet the claimed language.

f.   The applicant argues in pages 21-24 that Office notice of parallel

manner/processes is not well-known in the art and required full evidence to support the

obviousness.

The examiner respectfully submits that additional references for support purposes

are U.S. Application No. 2007/0233765 A1 and U.S. No. 6,704,438. As you can

seen these references, the parallel and series processes are known in the art

wherein they can be interchange with some trade-off and improvement. The

parallel process would improve the system performance by speed but cost

additional hardware and vice versa for the series process.

Conclusion

12.   Applicant's amendment necessitated the new ground(s) of rejection presented in this

Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHAT C. DO whose telephone number is (571)272-3721. The examiner can normally be reached on Tue-Fri 9:00AM to 7:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lewis Bullock can be reached on (571) 272-3759. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Chat C. Do/
Primary Examiner, Art Unit 2193

November 7, 2008